



Climate Change and Water Management in South Florida

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Confronting Climate Change

- Regional Water Resources System
- Two pronged approach:
 - What does science (global & regional) tell us?
 - Coordination with local/state /federal agencies
- Potential impacts on our mission
- Adopting a more measured approach

Confronting Climate Change (cont.)

- Two Important Questions:
 - Which decisions are likely to be affected and could benefit from adaptation strategies (**Type I**) in the short term?
 - Which decisions are likely to be affected but for which adaptation strategies (**Type II**) could be deferred without serious consequences?

Interdepartmental Climate Change Group at SFWMD

District Leadership Team Members

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Staff (Over 30) members from:

Creative Services	Operations & Maintenance
Everglades Restoration	Regulation
Intergovernmental Programs	Restoration Sciences
Modeling	SCADA & Hydro Data Management
Office of Counsel	Water Supply

SFWMD White Paper

DRAFT

CLIMATE CHANGE AND WATER MANAGEMENT IN SOUTH FLORIDA

November 12, 2009

Interdepartmental Climate Change Group
South Florida Water Management District

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Includes: What is known, What is probable, What is possible, and Information gaps

Change: Types and Potential Impacts

Climate Change Type

Natural Cycles

El Nino...(3-7yrs)
AMO* (multi-decadal)
Solar Cycle
Glacial (~thousands
of years)



Human Induced
Greenhouse
Gases
Global Warming

Quartet of change (Drivers)

- Rising Seas
- Temperature
- Rainfall, floods,
and droughts
- Tropical Storms &
Hurricanes

Water Management Impacts

- Direct landscape
impacts (e.g. storm
surge)
- Water Supply
(e.g. droughts,
saltwater intrusion)
- Flood Control
(e.g. urban flooding,
hurricanes)
- Restoration
(e.g. ecosystem
impacts, both
coastal and interior)



Sources of Sea Level Rise

What causes the sea level to change?

Terrestrial Water Input

Terrestrial water storage, extraction of groundwater, building of reservoirs, changes in runoff, and seepage into aquifers

Subsidence in river delta region, land movements, and tectonic displacements

Vertical Land Movement

Surface and deep ocean circulation changes, storm surges

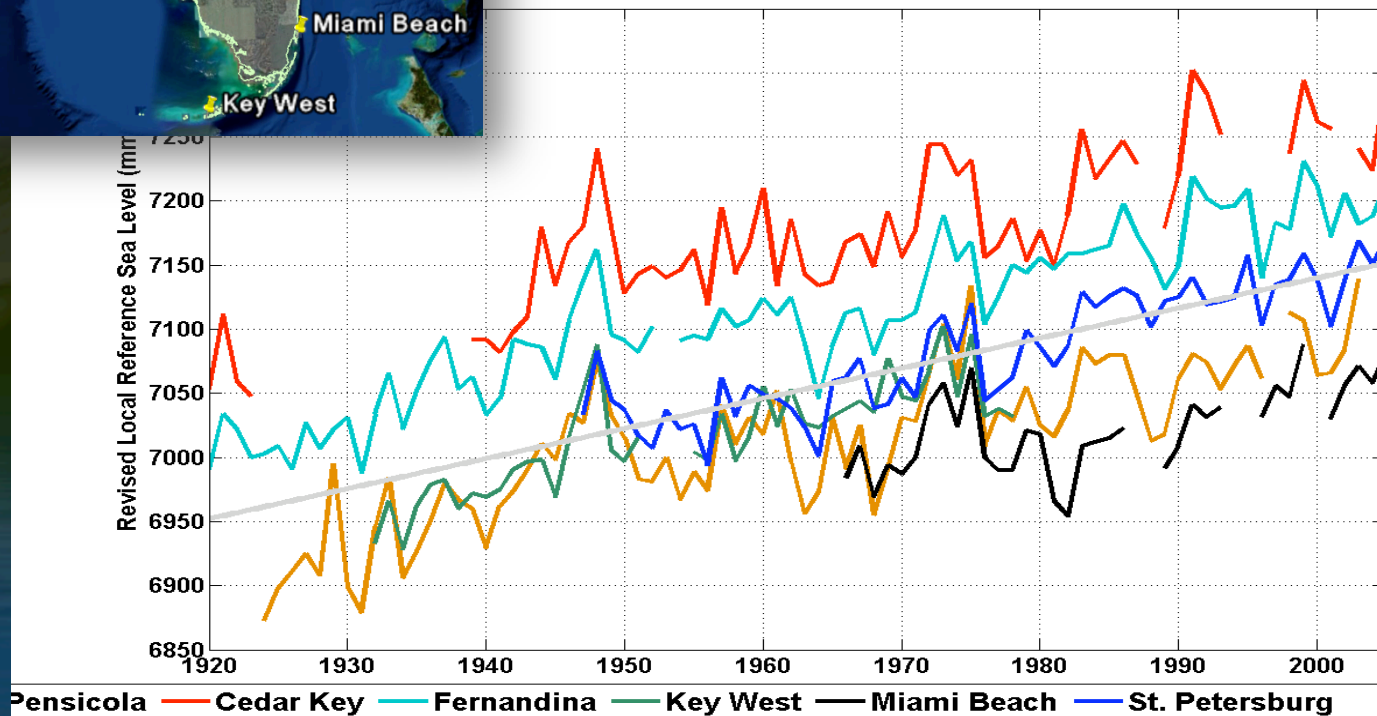
As the ocean warms, the water expands

Thermal Expansion

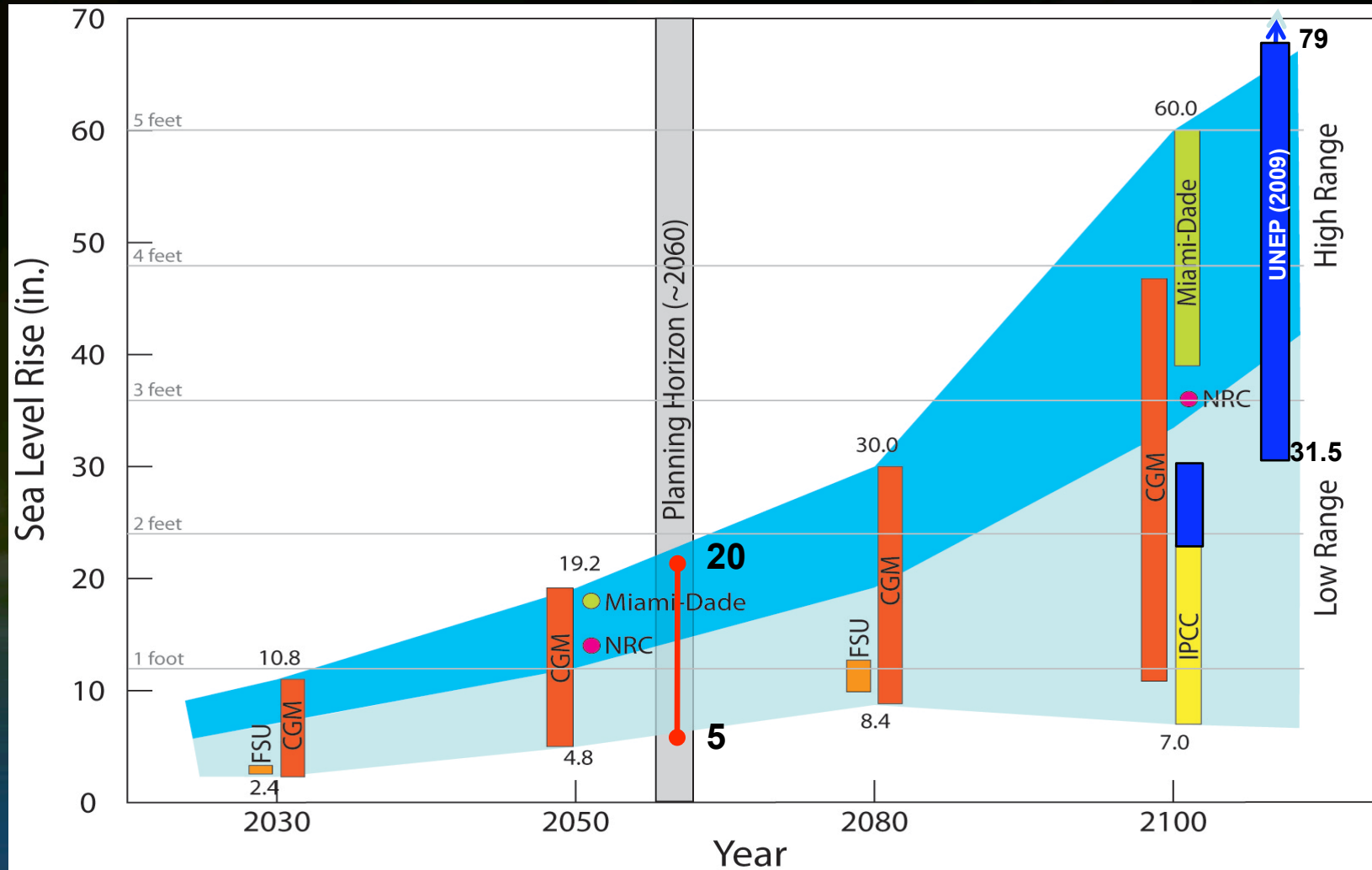
Land-based Ice (Glaciers, Ice Sheets in Greenland, Antarctica)

Exchange of the water stored on land by glaciers and ice sheets with ocean water

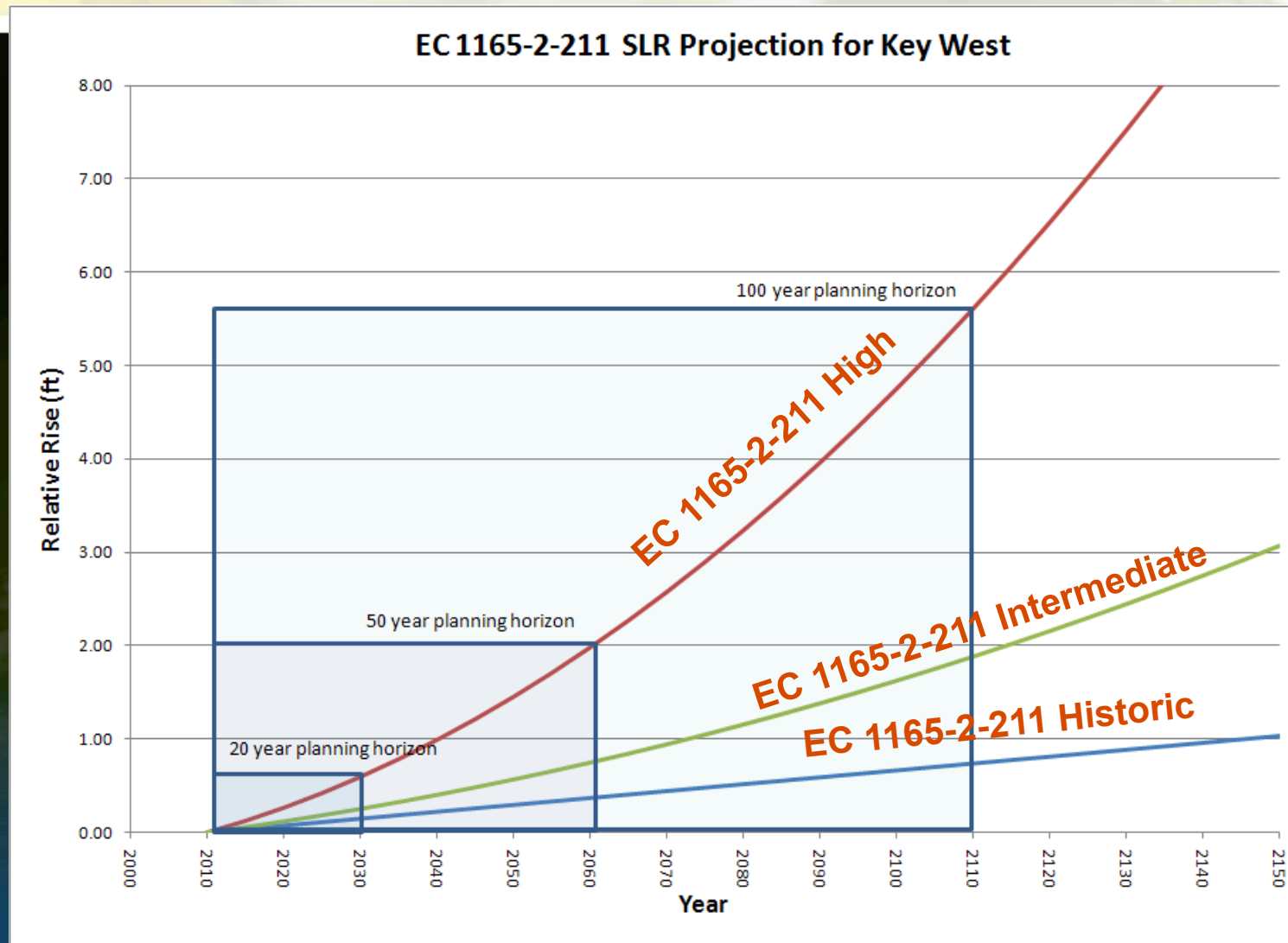
Rising Seas – already a reality



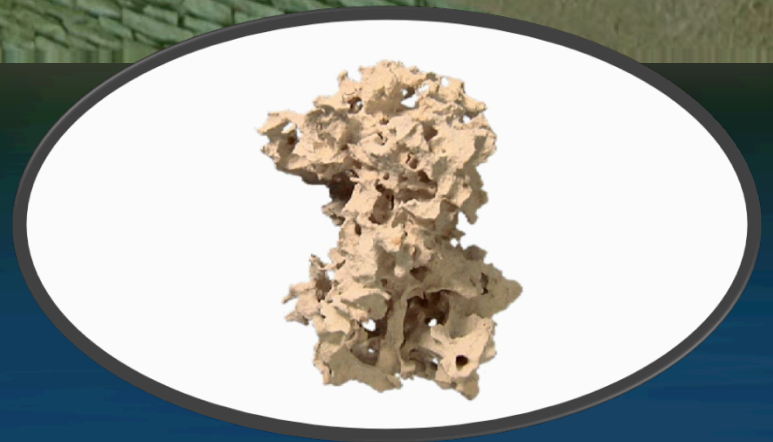
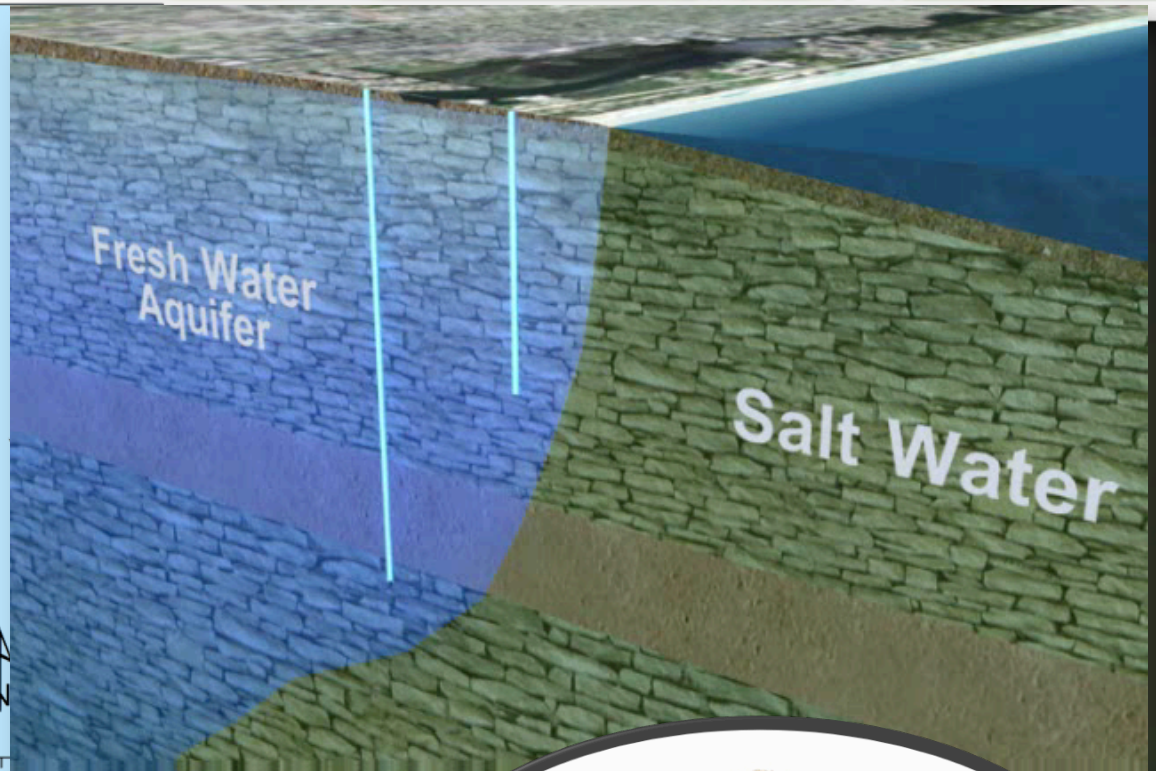
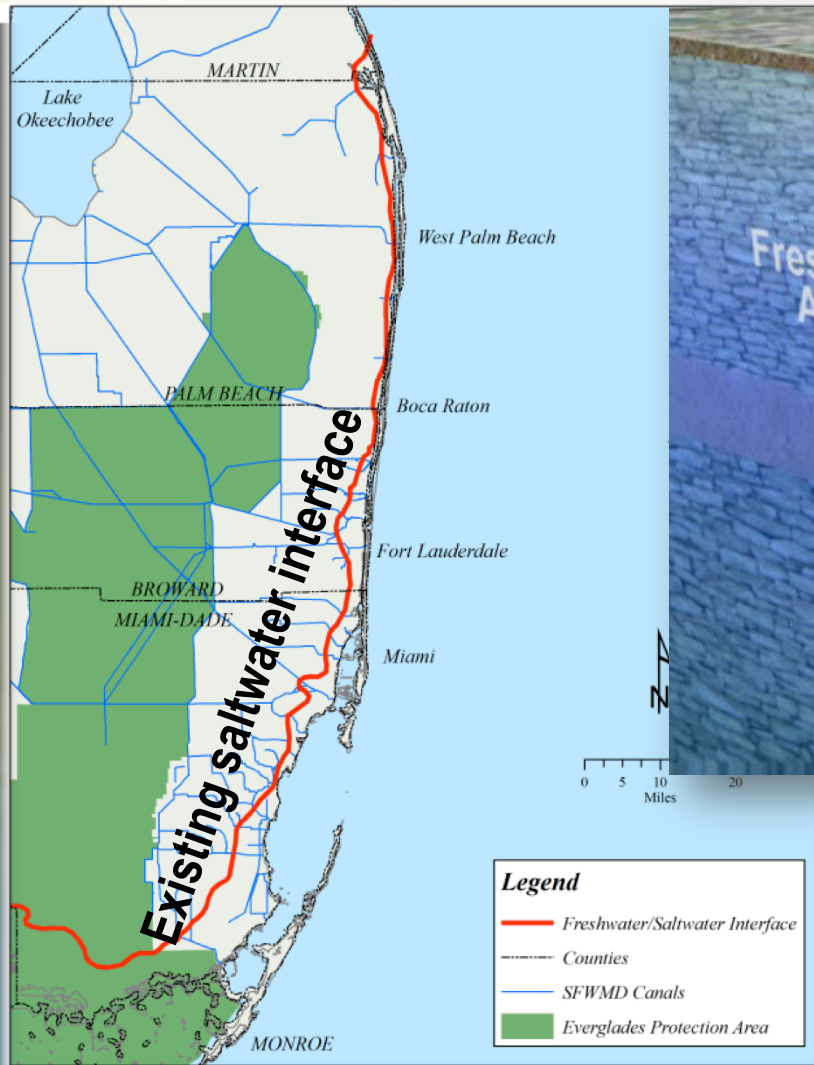
Future Projections: Considerable Spread



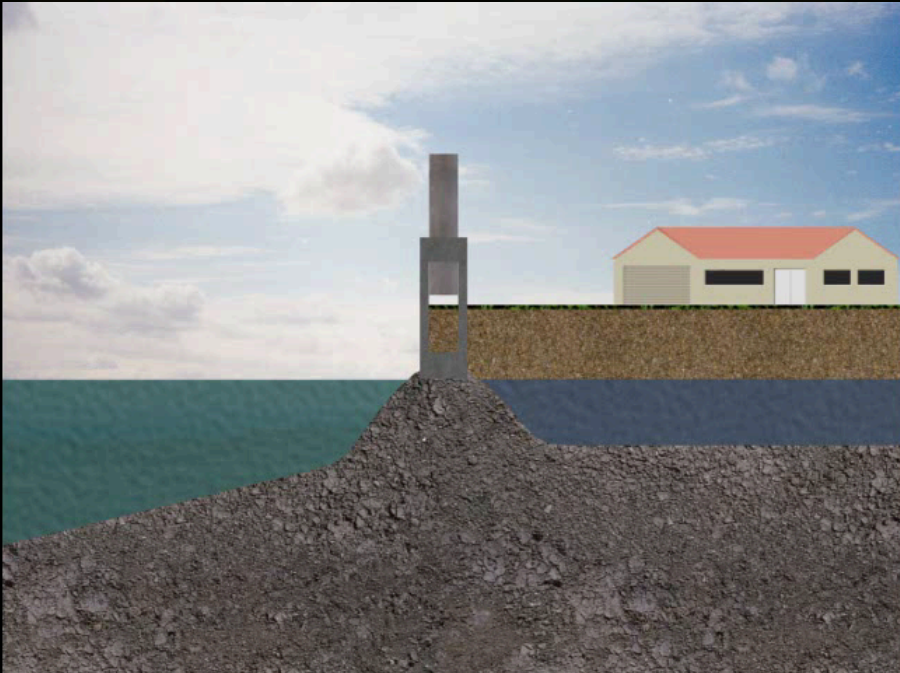
U. S. Army Corps of Engineers' Engineering Circular (EC 1165-2-211) Released July 2009



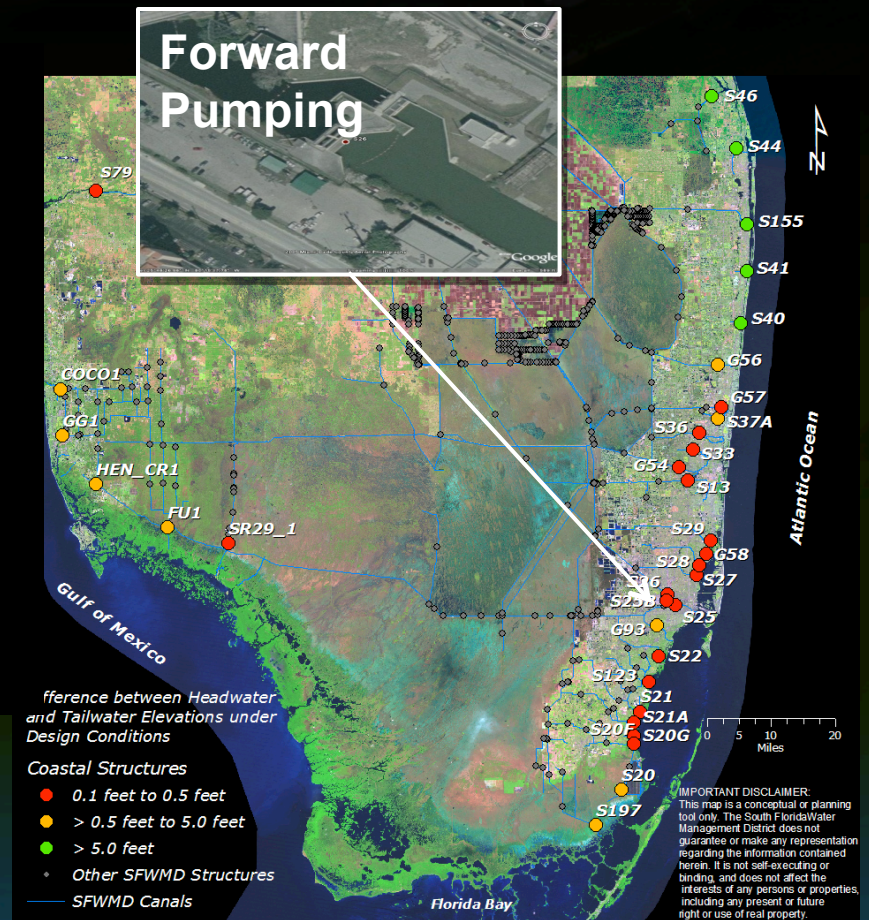
Rising Seas: Water Supply Impacts Saltwater Intrusion



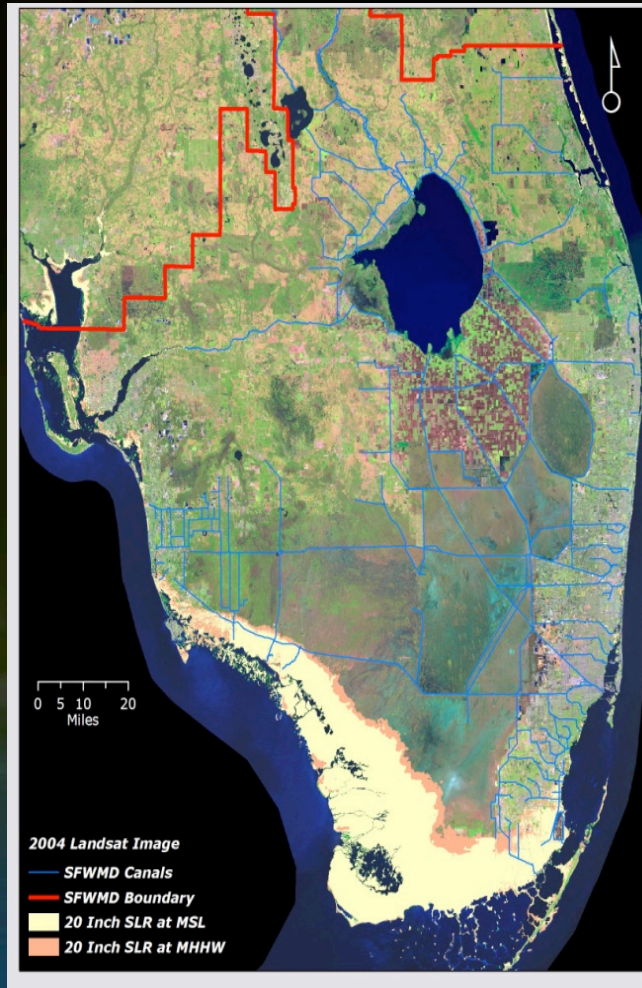
Rising Seas: Flood Control Concerns



- Small water level difference across coastal structures during high tides and local storms
- Flooding during high tide and storm surge



Rising Seas: Southern Everglades Restoration



- Relocation and possible reduction of mangrove forests
- Forced migration of wading birds north
- Potential peat collapse, coastal erosion, and redistribution of sediments
- Salinity intrusion into freshwater marshes can: discharge toxic hydrogen sulfide, cause coastal fish kills, and increase habitat loss

Conclusions

- History is not sufficient to make predictions.
- Sea Level Rise is more certain but significant uncertainties exist in projections.
- Current Climate Change projections:
 - 5 to 20 inches of sea levels by 2060. Need regional information and coordination with other agencies
 - Increase in temperature up to 7° F and Evapotranspiration up to 15%
 - Change in rainfall up to ± 20 percent
 - Changes in the strength and frequency of tropical storms and hurricanes. Exact extent is uncertain

Preliminary Recommendations

TASK	FY10	FY11	FY12	FY13	FY14
Continue to analyze historical trends & uncertainties of regional climate projections					
Jointly with other agencies develop modeling tools, and agree on planning parameters					
Understand vulnerabilities					
Develop & implement <u>Type I</u> adaptation strategies					
Develop & implement <u>Type II</u> adaptation strategies					

Local Government Climate Change Initiatives

- Primarily focus on greenhouse gas reduction and green initiatives
 - 16 cities have task forces/committees
 - 57 cities and 2 counties part of “Cool Mayors” program
 - 3 counties (Monroe, Orange and St. Lucie)
- Only 2 counties are looking at water resources – Broward and Miami-Dade

State and Federal Climate Change Initiatives

- 5 federal and national and 3 international initiatives
- Department of Environmental Protection – Initiated process to look at water resource impacts from climate change

Questions!

Recent cabinet meeting of the island nation, Maldives

